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ABSTRACT

The paper states that quantification is neither ethical nor unethical, but is ethically neutral. It is the behavior or intent of the human being that is clearly a matter of ethical concern. Like numerology and the sects of inumerates and qualitatives, there is not so much an unethical practice that is supported as there is a lack of vision and concern for other points of view. The qualitative and quantitative researchers have made it difficult to live in both their worlds even though there are no necessary contradictions between them. The quantifiers at the very least could have provided data to determine if students were attaining, or were even aware of, aesthetic values and ethical norms. If quantifiers detract students from a love of beauty or from a knowledge of ethical and unethical behavior, then quantifiers are failing their responsibilities, and their behaviors are examples of ethics gone wrong. Examples are given of scientism, a pseudoscientific belief that accepts the appearance and apparent successes of science without its essence, including a willingness to reexamine data, hypotheses, and theories when the evidence so suggests. Selected examples are presented regarding educational rationalizations that hinder understanding and free inquiry. (PN)

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THE ETHICS OF QUANTIFICATION AND WHY IT DOESN'T WORK
or
Life Among the Numerologists, Inumerates, and Qualitatives

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Unlike the sheik in a harem who knew what he wanted to do but didn't know where to start, I was not only uncertain where I should begin my presentation, but I also had no idea of what it was that Frank Besag wanted me to do. But taking my cue from an old story about the similarities between lawyers and prostitutes (that is, that the results are identical although methods may differ), I will assume that the title of my presentation was constructed to act as a projective technique that would permit me to read into it whatever has lain dormant in my subconscious through these many years. The subtitle was added as an extra feature. If title and subtitle are unclear now, just wait until my presentation is over for a truly polysemous obfuscation. This is not to be confused with clarity.

I do not believe that quantification is either ethical or unethical contrary to the main title of this paper. Guns, bread, and sealing wax are, like quantification, ethical neuters. No matter what the gunsmith or baker does or plans to do with their products, the products themselves remain ethically neutral while the behavior or intent of the human being is clearly a matter of ethical concern.

I am sure that there are some quantifiers who behave ethically and some who do not. The ability to quantify is not emotionally neutral; it has either been held in high regard—sometimes bordering on mysticism by the numerologists—or it has been vilified by those who believe that the very act of quantification is somehow simplistic, immoral, irrelevant, or degrading to what they believe is uniquely human. These vilifiers may be referred to as inumerates[1] who are much like their cousins, the illiterates, in that neither group is able to understand nor appreciate the range of human symbolic language or thought. The inumerates cannot perceive a mathematical derivation as beautiful or as something that can be uplifting to the human spirit. They fail to see the satisfaction that mathematics can provide, and like the rest of us, they attack what is not understood. The attempt by the extremists to divide research into qualitative and quantitative types is an example of this attack which was both unnecessary and wrong—unnecessary because the topics studied by the "qualitative" researcher were also being investigated by the "quantitative" researcher—

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[1] The term inumerate was, I believe, coined by Prof. H. Weaver some twenty years ago when I was teaching at the University of Hawaii. Herb was looking for an analogy in math to the illiterate in reading. I think his search was successful.

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and wrong because the distinction between the qualitative and quantitative are part of the same enterprise and require no rigid distinctions.

I find it as distressing to recognize ignorance of the arts among some otherwise intelligent mathematicians and scientists as I do the failure of the inumerates to disregard science and mathematics. A myopic attachment to quantification and the concommitant disregard of other concerns, especially in the arts, is a form of scientism, a pseudoscientific belief that accepts the appearance and apparent successes of science without its essence—a willingness to reexamine data, hypotheses, and theories when the evidence so suggests.

Like numerology and the sects of the inumerates and qualitatives, there is not so much an unethical practice that is supported as there is a lack of vision and concern for other points of view. The qualifiers and quantifiers have made it difficult to live in both their worlds even though there is no necessary contradictions between them. The quantifiers at the very least could have provided data to determine if students were attaining—or were even aware of—aesthetic values and ethical norms. If quantifiers detract students from a love of beauty or from a knowledge of ethical and unethical behavior, then quantifiers are failing their responsibilities, and their behaviors are examples of ethics gone wrong.

I recently came across an insidious use of quantification. I received an article in the mail from a research journal that I was to critique and recommend or deny its publication. The paper's unknown author had no data or evidence to support an amorphous series of opinions. The author stated that the evidence was subtle and could not be quantified in any statistical manner. Thus, concluded the author, the opinions presented would just have to be accepted. My answer to that was to recommend against publication. If some proposition cannot be quantified, that does not even suggest that some other nonquantifiable proposition is correct although of course it could be. Still, it is the responsibility of the author to garnish whatever evidence there is and to submit it for public scrutiny. The inability or undesirability of quantifying some proposition or observation is perfectly understandable, but it does not follow that because a subtle argument is, in fact, subtle, that evidence for the validity of the proposition is true. The inability to quantify proves nothing. The sciences—and particularly the behavioral sciences—may have created an illusion of false accuracy and complexity. In part, this need has been derived from a desire to be recognized and counted as part of the classical or "hard" sciences. This is scientism pure and simple, and its proponents deserve no "credit" for being ethical. Scientism has lurked in the shadows of statistics—not so much by the efforts of the statisticians as by the failure of practitioners and users of statistics to behave ethically. If it were ethical to do so, I could recite numerous "research" and "evaluation" reports that persuade me to believe that the authors were more concerned with political and economic realities than they were with ethical issues. A few examples should suffice:

1. An investigator failed to mention the large initial differences between experimental and control groups;

2. In another study, the only data reported were in favor of the experimental group (differences favoring the control group were omitted although relevant);

3. No control group was used even though a comparison was possible and necessary;

4. The experimental group was taught a specific lesson that was withheld completely from control groups (the conclusion was largely in favor of the experimental group);

5. Findings were suppressed that could, if disseminated, result in loss of training funds;

6. A page was removed from an individually administered standardized achievement test and was replaced with easier items without changing norms.

It is important to keep in mind that these are only a few of the many examples that could be used to demonstrate what is clearly unethical. The examples I have enumerated here are not spectacular, they are not uncommon. They represent not only a callous disregard and concern about ethical matters, but they also exhibit a dangerous tendency to take the ax to axiological inquiry. In each instance, the responsible persons knew what they were doing and the effect that their behavior would have. In retrospect, I would argue that no evaluation was conducted in any of these "studies;" instead, justifications were prepared for continuing programs of questionnable value. As far as the ethics go (and that isn't very far), the practices I have described would be unethical for quantitative as well as for qualitative research.

I have not touched upon certain statistical niceties that have found their way into "research" reports and were eventually published. Not all of these "errors" should be classified as unethical—reflections of ignorance, perhaps, but not dishonesty. We are all subject to honest disagreements, and prepublication review procedures try hard to catch the most serious ones. A breach of ethics assumes that practitioners (whether of science or voodoo) know the differences between ethical and unethical behavior and that they chose to disregard the road to righteousness. All professions have codes of ethics that may not be violated with impunity if the perpetrator is caught with hand in till, and education is no exception. Then how do these unethical practices "get by"? I suspect that one reason is the "numbers game." This game is played for high stakes, the conclusions are known in advance of the treatment, and statistical gobbledegook is sufficiently impressive that readers concern themselves with the conclusions of a study and will disregard how the study was conducted. In referring to the mystique of quantity, Abraham Kaplan (1964) stated that:

> In these matters the mystique of quantity is especially widespread, as though a statistical formulation somehow provides its own content. The magic of numbers cannot produce cognitive rabbits out of truly empty hats. In common with all other branches of mathematics, statistics alone is but an instrument for transforming data, not for producing them.[2] And when the data have been cast in statistical form, they are still data; they have not thereby been made into a scientific conclusion. The point to the statistical formulation and transformation is to enable us to extract all the information that the data contain, so that we can bring them to bear on the hypotheses for which they are data. (p. 220)

The statisticians are not entirely innocent in these matters. Uponrare occasion they pretend that theirs is the only road to salvation, and by doing so they themselves lend credence to the quantitative mystique. Or arrogance may intrude upon the scene by attacks on the well-meaning but "fuzzy" thinking attributed conveniently to the arts and to whatever is meant by qualitative research. To quote Kaplan (1964) once again:

> The point is that both quality and quantity are misconceived when they are taken to be antithetical or even alternative. Quantities are of qualities, and a measured quality has just the magnitude expressed in its measure. (page 207)

Every profession has developed modes of rationalizing the behaviors and beliefs of its members. Unfortunately, education is not exempted from this discussion. These rationalizations protect and guard against open inquiry and have, from time to time, even been known to stifle communication and dissent. A few examples should suffice. For want of a better term, let us refer to these rationalizations as hindrances to understanding. Time limitations require selective examples.

1. I have heard more than one faculty member argue that the very selection of a research topic is sufficient to demonstrate experimenter bias. Their argument goes something like this: first, the selection of a research topic depends on many personal and subjective factors; and, second, if there is bias in selecting a topic, that bias is likely to spill over into methodology and into subjective and biased conclusions. A corollary of these propositions is that quantification distorts reality by hiding it under the cloak of scientism.

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2 After the recent allegations regarding the authenticity of Prof. Cyril Burt's data, I am not so sure that Kaplan is entirely correct on this matter. It may be that some statisticians are not only the midwives of data, but they may even take an active role in quantitative conception.

If points one and two in the previous paragraph are accepted, we are indeed in a morass of philosophical trouble. We might argue that every investigation and study has, at one time or other, been selected by someone and that therefore we are all guilty of subjectivity and ultimately of unethical behavior. It is the jump from subjectivity to unethical behavior that causes my grief. Subjectivity, properly identified and described, has its place in scientific thinking. It is as silly to imagine a science without subjectivity as it is to imagine qualitative research that bears no relationships to number systems and processes. In a sense, the qualitative researchers have had to come to grips with attacks from "the other side" whereas those of us with a more quantitative bent are still fighting members of our own team.

To accept the premise that subjectivity inevitably leads to bias is to court disaster, for every choice—scientific or not—will always end up as an epistemological caricature in which we play the role of the bumbling fool who runs down one path and onto another without thought. Although this kind of tomfoolery is distasteful, it does not represent bias, which refers to the wanton disregard of evidence or the creation of convenient but untrue propositions. It is not the selection of a topic of study that leads to bias but rather that once a topic—any topic—is selected, bias too easily interferes with judgments.

2. Quantification can act as a rationalization for failing to educate, and we, the quantifiers, have done little to eliminate this problem. The assignment of test or course grades can serve as an example of the principle.

I believe it was B.F. Skinner who said that a Frenchman who asks for salt in France expects to get salt; in our French classes, an American who asks for salt gets an A but no salt. We all abhor the student who "works for grades," but we must have forgotten how the student became that way. Students do not work for grades when there are no grades to receive. But given sufficient time with grades as an incentive and reinforcer, we can't deny our role in this matter. Moreover, I will suggest that our behavior in this regard is unethical because we have taught the student to work for grades rather than for the love of learning when that was our intent. It is also unethical if we could have done otherwise.

At an elementary laboratory school with which I am familiar, no students received letter or numerical grades until they attended the eighth grade. Up to that point, one could easily observe students actively participating in learning—hands were raised to answer teacher questions, students volunteered to work on various projects, students arrived early and stayed late on their own volition, and the like. But all of that ended when grades were first assigned in the eighth grade. Hands that went up before, now remain in catatonic inflexibility; the former volunteers now slump in their chairs for fear that they will be called upon. From time to time some

students do volunteer but only after they determine the amount of credit they can expect to receive.

The grades themselves are not unethical—only people and their behaviors can be described in those terms. So haven't we acted unethically by pretending that there is some rational way to divide students among the letters A to F when we know perfectly well that we cannot do so? Aren't we acting unethically when we state that students must earn a score of, say, 85% (or say any other value that happens to please your fancy) to pass a test? If zero percent has no meaning, and if 100 percent has no meaning, then I will argue that 85% or any other percentage also has no meaning.

It is important to understand that I am not advocating the elimination of grades; my argument is only never to introduce them. Once assigned, they cannot be eliminated easily. Would you give up your paycheck and "work for the love of it"? Once grades have reinforcing properties, you remove them at your own peril. Grades, then, become goals, and they got that way because we wanted a measure that was simple. That type of quantification has led to undesirable behaviors that failed to work as we wanted them to. What is unethical is our failure to speak out against a practice that we cannot justify. If my daughter receives a C in some subject, how can I help her to improve? I suppose that an A means that she needs no help and an F that it is too late for help. So grades are not diagnostic, their meaning is unclear, and they will not be eliminated until something equally coercive and simple comes along.

Grades do have one advantage that I should mention: they help us to rationalize our failure to teach and students to learn. Suppose a class is given 10 spelling words to learn and that Randy learns 6. Randy is given a grade, say, of C-. Next week another 10 words are given, and Randy learns another 6. So far, Randy has missed 8 words that the teacher will probably not require Randy to learn. Everyone (including Randy) believes that the teacher's job is finished when grades have been assigned.

3. We are all familiar with the terms under- and over-achievement.[3,4] In using these terms, two measurements are needed: a measure on some

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[3] I apologize to R.L. Thorndike whose book The Concepts of Over- and Underachievement brought these points home in far better fashion than is possible here.

[4] I have been told by some faculty members that overachievement is impossible, unlikely, or "bad for children." Underachievement, however, is both possible and likely and "bad for children." Fortunately for the children, most are "working up to capacity," a situation I have yet to observe among adults.

criterion value such as an intelligence test score and a measure of achievement such as is found on many standardized tests. We administer the intelligence test and the achievement measure and determine which is higher. A high IQ coupled with a low achievement score defines an underachiever; the opposite relationship leads to overachievement. Evidently our goal in life is to make sure that students are neither unders nor overs ("too much of a good thing, you know?"). Fortunately for us, the correlation between IQ and achievement test scores is rather high. This is of unestimable value in creating "well-adjusted equals." And with just a bit more effort, we can remove the stain of guilt from us and place it squarely where it rightly belongs—on the heads of the children, of course! We perform this magic act by making sure that we label the students as overs or unders. It is not that we have a prediction problem; instead, the children have the problem. We could create more overs and unders if we could just reduce the correlation between IQ and achievement test scores (that should be easy to do should any of you be looking for a consultant). By labelling the children as unders and overs, we remove from ourselves any responsibilities that someone might dream up. In mastery learning, the children are masters or nonmasters, and we are merely the recorders of that difference; the children are failures or nonfailures, and our responsibilities end once we push them into the correct bin. Note the beauty inherent in what we are doing. When a child gets into trouble we can provide the reason: underachievement, overachievement, failure to master key ideas, learning disabled, over-egocentric, under-egocentric, etc. Of course parents have to be brought into the discussion since they may have problems that affect children. The perpetuation of the kinds of myths I have described in the preceding paragraphs is clearly unethical (and unfair to boot).

4. We should have joined forces years ago with the qualitative researchers. It would have been a winning combination. On one widely used reading test, students were asked to select a synonym for start and vacant. That particular test yielded scores in the natural sciences, social sciences, mathematics, or "general" category. Where do start and vacant belong? Responding correctly to either earned points on the social science scale (the reference must have been to vacant lots; I am willing to accept any hypothesis regarding start). Items were also classified by type of student error. But on some scales, math for example, there was only one item on telling time and one item involving subtraction with decimals. Instead of just complaining about the lack of items, the joint quantitative-qualitative union would have allowed us to categorize some students as having dyslexia, functional cerebral disbalance, or idiopathic cerebral dysfunctioning.

5. Just one last topic. Experimentation and quantification have worked together for many years and with mutual respect. But even here we can get into ethical problems. The December 1970 issue of Psychology Today had a few interesting examples that I doubt would get by the University of Washington's Behavioral Sciences Review Committee. In one of these examples, male subjects were asked to watch semi-nude pictures of men and were told that the degree of their own homosexuality could be discerned by look-

ing at a calibrated galvonometer. That "galvonometer" was not attached to anything, but the experimenters could move the dial. Need I say more? In another experiment, subjects were told that they had broken a machine that was needed for the experimenter's MA degree; 56% of the subjets were willing to sign a petition to double the tuition rates to help an investigator who was identified only as belonging to the Young Democrats.

I am sure that the establishment of peer-review committees has improved the ethical responsibilities of universities and subjects who participate in studies. My fear is that perhaps we may have gone too far and that we might be cheating society by withholding permission to conduct some studies. There is a fine line between peer review and censorship, and it is getting more difficult to know when to apply each. Perhaps meetings such as the one we are holding today can help.

REFERENCES

Kaplan, Abraham. The Conduct of Inquiry: Methodology for Behavioral Science. San Francisco: Chandler Publishing Company, 1964.

Thorndike, Robert L. The Concepts of Over- and Underachievement. New York: Bureau of Publications, Teachers College, Columbia University, 1963.

NOTES

Although not referred to in this presentation, I would like to suggest the following as an interesting resource: Phillips, D.C. "On What Scientists Know, and How They Know It," Chapter III in Elliot Eisner (Ed.) Learning and Teaching the Ways of Knowing. Chicago, Illinois: University of Chicago Press, 1985, pp. 37-59.

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